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**"ІНФОРМАЦІЙНІ СИСТЕМИ
ТА ТЕХНОЛОГІЇ В МЕДИЦИНІ"**

ЗБІРНИК НАУКОВИХ ПРАЦЬ

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

ХАРКІВСЬКИЙ НАЦІОНАЛЬНИЙ УНІВЕРСИТЕТ РАДІОЕЛЕКТРОНІКИ

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acquainted with the user, learns his weight and growth, it allows the application to draw conclusions about the daily calories.

The 'Calories Counter' includes everything that is missing in other applications. For example, using detailed information about the product (Fig. 3) allows the user to make a choice between the products by the necessary parameters (fats, proteins, carbohydrates) to make his daily diet.

'Calories Counter' Rel A, Rel B have a useful feature that makes the connection between user and his nutritionist easier. User don't need to call or message his doctor for sending the information about daily meals by himself anymore, the application can send this to doctor's mail by itself. User should just set a time for sending and a doctor's email. Additional feature could store personal data at the cloud resources. This function could organize the access service to the stored data. The application at the cloud side generates the html reply for the remote web request. The data are presented in tables for the main controlled variables. All the data will store in the cloud to not make mess to the phone user and make sending more quickly.

III. Conclusion. To sum up, now it's possible to conclude, that the app "Calories Counter" gives an opportunity to control the own diet plan. The app helps to visualizes diet data and to add products to the daily product list. The 'Calories Counter' expand the opportunity of working with the nutritionist by use a web service. For this there is a common profile for user and the doctor. So, if user synchronize his application with the profile, he is able to receive a list of daily meals from the nutritionist through the Internet everywhere. The new version will be closer to the user because of making notification about the meal. New features will allow to add new food by scanning bar-codes.

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AUTOMATED SYSTEM FOR ASSESSING THE HEALTH STATUS OF STUDENTS FOR CONTROLLING AND CORRECTION OF ACTIVITY LEVEL DURING THE COURSE OF PHYSICAL EDUCATION

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The work is devoted to the identification of risks of sudden circulatory disorders and controlling the adequacy of physical activity in sports. The created system based on comparison of the results of a Martine test with the previously known patterns of response to physical activity. The algorithm for finding the minimum distance to a certain pattern and its distance from the centroid of the cluster was automated to generate the conclusions about the current functional state of the circulatory system of a student.

Doing sports is always expected to be healthful but there is some risk to choose wrong physical activity. In this case person will not improve physical parameters, he or she even may have negative effects on health. Monitoring of physiological condition during all period of sport trainings can help to avoid undesirable situations. Moreover, it gives opportunity to control and change sport program in way to improve physical results.

The objective of the work is to create a system for registration changes in the functional state of the circulatory system by comparing the test parameters with predefined functional blood circulation patterns based on the criterion of the minimum Euclidean distance and to form basic and additional conclusions about the state of the organism.

Data for this work were obtained by the Department of Physical Education. In the process of research was made the students database of the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute" which contains the basic physiological parameters and parameters of

circulatory system functional state. During the courses of physical education students were systematically used self-monitoring methods for monitoring and recording their own health state. All students went through Martine's functional test which gives the dynamics of changes in blood pressure and pulse between the resting state and every minute for five minutes after exercise.

The first step was the determination of the functional patterns (centroids of clusters). For this aim were used database from 353 quantitative indicators of a physiological state of 1419 students of which 800 men and 619 women. All these parameters were analyzed and then were used only those that reflect the functional state of the circulatory system and the psychophysical state of subjects. The dimension of clustering space of the circulatory system functional state is 18: systolic, diastolic blood pressure and heart rate for 6 periods of time Martine's test.

Functional patterns (the ratios of the above indicators) for male and female groups were determined separately with using cluster analysis of "k-means" method. Previously research gave 7 clusters for male part and 8 clusters for female. These groups were significantly different from each other by the character of responses of blood pressure and heart rate metrics to Martine's test. As a result, centroids of the resulting clusters were further considered as functional patterns (the most typical representatives) of body's response on the test of physical activity.

For next step – studying of changes in the state of the circulatory system, were used the database which contains 590 student's observations (268 female and 322 male) and 133 indicators of the psychophysical status of students. Data was received from repeated students' tests, which were performed from 2 to 6 times at different time intervals.

As a criterion for the proximity of the individual student to the center of a particular cluster was used Euclidean distance algorithm.

As a result, the next algorithm was developed and implemented as a program:

- 1) determination of the cluster with minimal distance to the analyzed object with using proximity measure;
- 2) determination of the subminimal Euclidean distance to the next cluster, that is, the next minimum distance to the cluster;
- 3) determination whether the parameters of this test were located within the average radius of the cluster ("yes" or "no");
- 4) if test parameters are located within the cluster average radius, only information about functional and psychophysical features of the closest cluster will be displayed as a result;
- 5) otherwise, information about functional and psychophysical features of the cluster with a subminimum distance will be displayed in addition.

Results of the system work were compared with expert assessments. The coincidence accuracy of both types of estimates was 87%.

The program provides for the possibility of changes. The size of the input vector (input structure) and the number of functional patterns are not fixed and can be modified in the process of improving the system.

Conclusions. Realization of this algorithm allows to analyze the received data, to determine conditions which lead to changes in blood circulation such as reduction of regulatory reserves and significant increase in blood pressure. This gives an opportunity to control the individual level of physical activity, modifying the training program and identifying situations that require additional medical control.

Moreover, system based on this algorithm can be used for screening control of large groups of students. It helps with identification of persons with high risk of sudden circulatory disorders and to take restrictive in training and medical actions on time.

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